Emotion Recognition System

VibraImage

Version Lite 7.2

Manual

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1. Introduction

1.1. Basic applications

VibraImage software solves the following technical tasks:

- Emotional levels parameters recognition and detection;
- Surveillance in real time vibraimage
- Surveillance in real time images of aura;

VibraImage program have some modification. The choice of modifications is carried out at a stage of software installation.

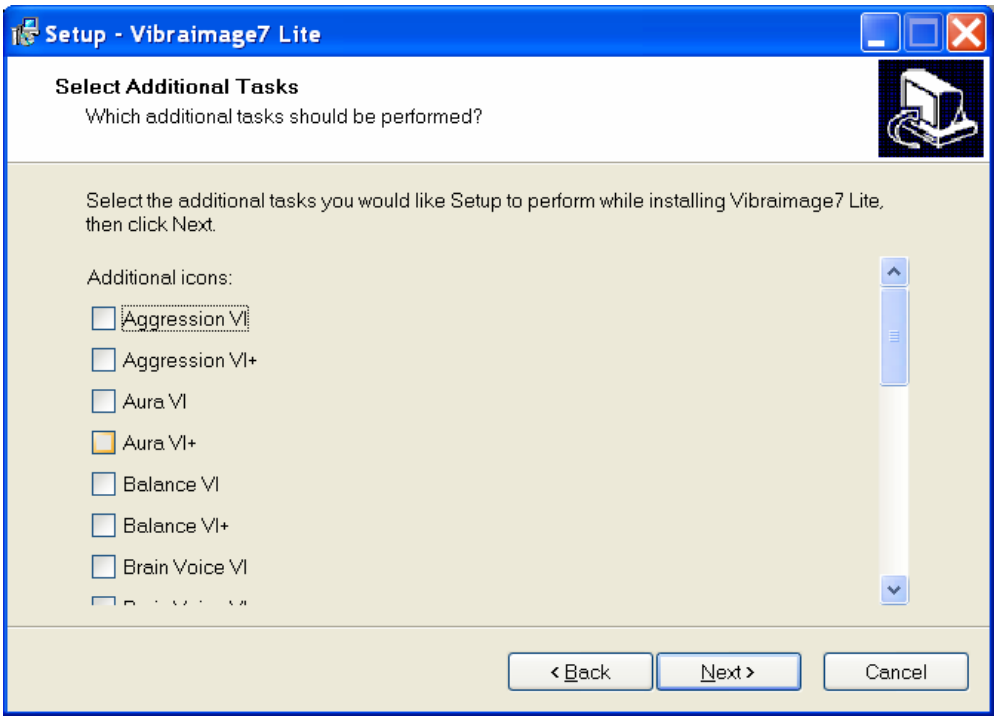


Fig. 1. VibraImage modification select

1. Aggression VI – detection of aggression level is one of the base human emotions. Every person has some aggression or aggressiveness level and low aggression level is the same pathology as high aggression level. User could control his own aggression level, or aggression of friends, partners and any controlled person.

2. Aura VI – Construction of aura of the person

3. Balance VI – Detection of steadiness of the person

4. Brain Voice VI – Construction of sound aura of the person

5. Biotester VI - Construction of aura and vibraimage of the person and definition of its frequency characteristics

6. Charming VI – Definition of a level of charm the person

7. Compatibility VI - check a compatibility level of friends and familiar at any moment.

8. Energy VI - Definition of a level of energy of the person

9. Stress VI - Some of scientists don't correspond stress with emotions, however, nowadays stress is the most popular word characterizing human mental state. **VibraImage** allows fairly analyze own or others stress level, that is important for regular mental health control, also as precautions, rehabilitation and cure for depression states.

10. Suspect VI – definition of the common level of potential danger of the person

11. Tension VI - Anxiety (fear, tension) presents physical emotion realization, produced by any alarm, independently from conscious or unconscious of this state by person. **VibraImage** program intends for anxiety level analyzing, allows to indicate unconscious alarm and fear, so assists in it medical treatment

If in the name of the program there is a sign "+", for example **Energy VI +,** its means that this updating of the program additionally supports work with program **Skype.**

All parameters are calculated in a range from 0 up to 100 %, the greater value of parameter corresponds to the greater calculated value.

1.2. Specifications

1.2.1. Vibraimage system data

- Resolution, TVL, more than 400
- Noise level of VibraImage, bit, less than 0,1
- Frame speed, frame/sec, more than 12
- Frequency range, Hz, more than 0,1 ÷ 10

1.2.2. Digital (web) camera requirements

- Sensor CCD or CMOS Sensor
- Resolution, pixel. From 640 x 480 till 1280 x 1024
- USB compatible USB 1.0, USB 2.0
- Frame speed, f/s, more than 10
- Microphone external
- Exposition control auto and manual
- Color mode color and B/W switch
- Flicker mode Flicker 50Hz and 60Hz

1.2.3. System requirements for local module computer

Operation System	Windows XP Prof/Vista with DirectX 9.0 or later
Processor	PC with Pentium Core Duo2 2000 or better
RAM	1024MB or better
HDD	100GB or more free space
DVD-ROM	DVDRW
USB port	1free USB ports version USB 2.0
PCI slot	1 free slot (option)
Video capture	WDM-compatible video device

1.3. Package contents

1.	VibraImage Lite software	-	1
2.	Internet key	-	1
2.	User manual	-	1
3.	Digital USB camera (options)	-	1
4.	Microphone (options)	-	1
5.	Personal computer (options)	-	1

2. VibraImage software installation

It is necessary to execute the following actions for installation of VibraImageLite program on your computer:

1. Go to Web page http://www.elsys.ru/downloads_e.php#Vibraimage7Lite.zip
2. Load file http://www.elsys.ru/downloads/Vibraimage7Lite.zip
3. Run file Vibraimage7Lite.exe from archive file;
4. Select language for installation procedure;
5. Press button «Next» in the appeared window of the beginning installation;
6. Accept the license agreement and to press button «Next» in the appeared window;
7. In the appeared window specify a way to the catalogue where files of the program will be written down, then to press button «Next»;
8. Press button «Next» in the appeared window, allows installation of software files on your computer;
9. In the appeared window select versions of the program which you want to install on the computer (Fig. 2)

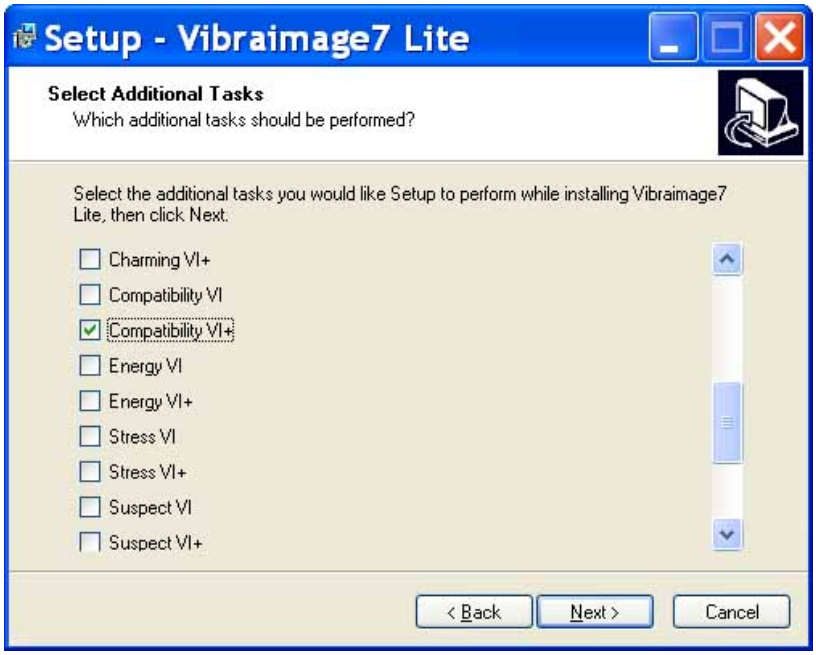


Fig. 2. VibraImage modification

10. Press button «Install» at the start of installation.
11. If you want to build the VibraImage program in other application, in the appeared window it is necessary to choose item of installation of virtual camera drivers, and press “Next”;
12. Press button «Finish» at the end of installation
13. VibraImageLite program pictograms appears after the end of installation in system menu and on desktop of your computer;
14. To reboot a computer.

2.1. VibraImageLite software activation

Attention!

1. Procedure of activation is made once at the first start of the program.
2. The received serial key for activation can be used only once.
3. Activation procedure demands access to the Internet for acknowledgement key from server.
4. Each key of activation is intended for work with its "version" of the program.

Key type	Software “version”
VI7_xxxxxxxxx_C	**Compatibility VI** software is intended for check of compatibility of two people
VI7_xxxxxxxxx_DC	**Compatibility VI+** software is intended for check of compatibility of two people with Skype support
VI7_xxxxxxxxx_A	**Aggression VI** software is intended for check anger level of person
VI7_xxxxxxxxx_DA	**Aggression VI+** software is intended for check anger level of person with Skype support
VI7_xxxxxxxxx_Z	**Aura VI** software is intended for check aura and vibraimage of person
VI7_xxxxxxxxx_DZ	**Aura VI+** software is intended for check aura and vibraimage of person with Skype support
VI7_xxxxxxxxx_DK	**Biotester VI+** software is intended for check aura and vibraimage of person, its frequency histograms and with Skype support
VI7_xxxxxxxxx_V	**Brain Voice VI** software is intended for check “sound aura”of person
VI7_xxxxxxxxx_DV	**Brain Voice VI+** software is intended for check “sound aura” of person

	with Skype support
VI7_xxxxxxxxx_D	**Suspect VI** software is intended for check suspect level of person
VI7_xxxxxxxxx_DD	**Suspect VI+** software is intended for check suspect level of person with Skype support
VI7_xxxxxxxxx_S	**Stress VI** software is intended for check stress level of person
VI7_xxxxxxxxx_DS	**Stress VI+** software is intended for check stress level of person with Skype support
VI7_xxxxxxxxx_T	**Tension VI** software is intended for check tension level of person
VI7_xxxxxxxxx_DT	**Tension VI+** software is intended for check tension level of person with Skype support
VI7_xxxxxxxxx_B	**Balance VI** software is intended for check balance level of person
VI7_xxxxxxxxx_DB	**Balance VI+** software is intended for check balance level of person with Skype support
VI7_xxxxxxxxx_H	**Charming VI** software is intended for check charm level of person
VI7_xxxxxxxxx_DH	**Charming VI+** software is intended for check charm level of person with Skype support
VI7_xxxxxxxxx_E	**Energy VI** software is intended for check energy level of person
VI7_xxxxxxxxx_DE	**Energy VI+** software is intended for check energy level of person with Skype support

Activation procedure:

1. For the activation beginning it is necessary to start the program.

2. At the first start of the program the activation window (Fig. 3) will be displayed.

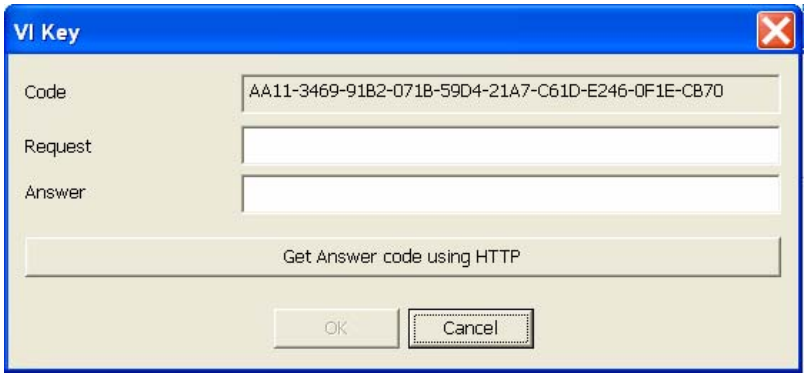


Fig. 3. Activation window

3. In field "Request" it is necessary to enter the serial number of a key received by e-mail or specified by the seller. After input of a key to press the button “Get Answer code using HTTP”.

Please, be careful and paste code without additional gaps!

4. The activation key will be checked up through the Internet and, in case of successful end of activation procedure, the acknowledgement code (Fig. 4) will be sent.

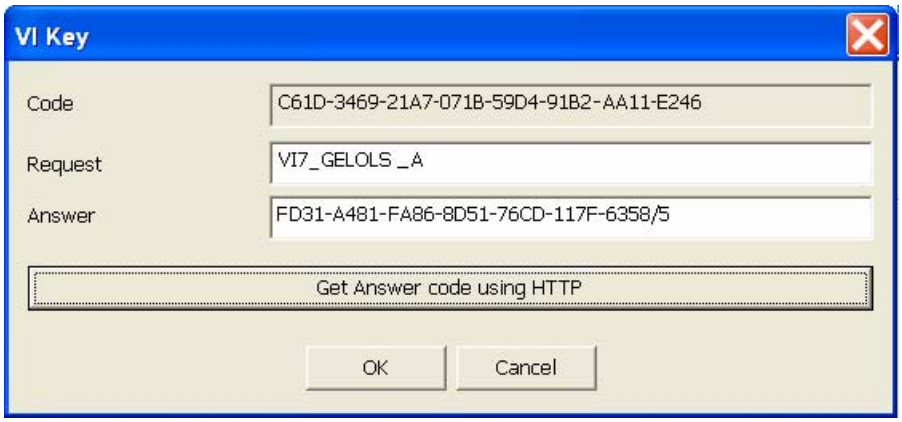


Fig. 4. Successful activation

5. To press button " OK ". Program VibraImage7Lite will be automatically started in selected mode.

6. Begin work with system.

3. VibraImageLite. User manual

VibraImageLite software is intended for reception, processing and the analysis of electronic images of the alive biological objects making periodic vibration movings of various frequency and amplitude, and also can be applied and concerning the lifeless objects making periodic vibration movements.

After start of VibraImageLite program in the basic window there is an image from video device.

3.1. Main window

Main window (Fig. 5) consists of the following parts:

- image area (on right side);
- information window (on left side).

In an information column (at the left side on the screen) it is displayed, calculated by the program, values of person emotion level parameters. Note, the type of the displayed parameter depends on the running program.

Running program	Parameter
Compatibility VI	In an information column the compatibility level of two people is displayed
Aggression VI	In an information column the person anger level is displayed
Aura VI	Information column is not used
BioTester VI	In an information column is displayed the basic button for switch on/off basic work mode (Fig. 7)
Brain Voice VI	Information column is not used
Suspect VI	In an information column the person suspect level is displayed
Stress VI	In an information column the person stress level is displayed

Tension VI	In an information column the person tension level is displayed
Balance VI	In an information column the person balance level is displayed
Charming VI	In an information column the person charm level is displayed
Energy VI	In an information column the person energy level is displayed

In heading of the basic window the following information is deduced:

- type of video source: Video camera or AVI file;
- model of video source: Video camera model or AVI file name;
- Name of running VibraImage module

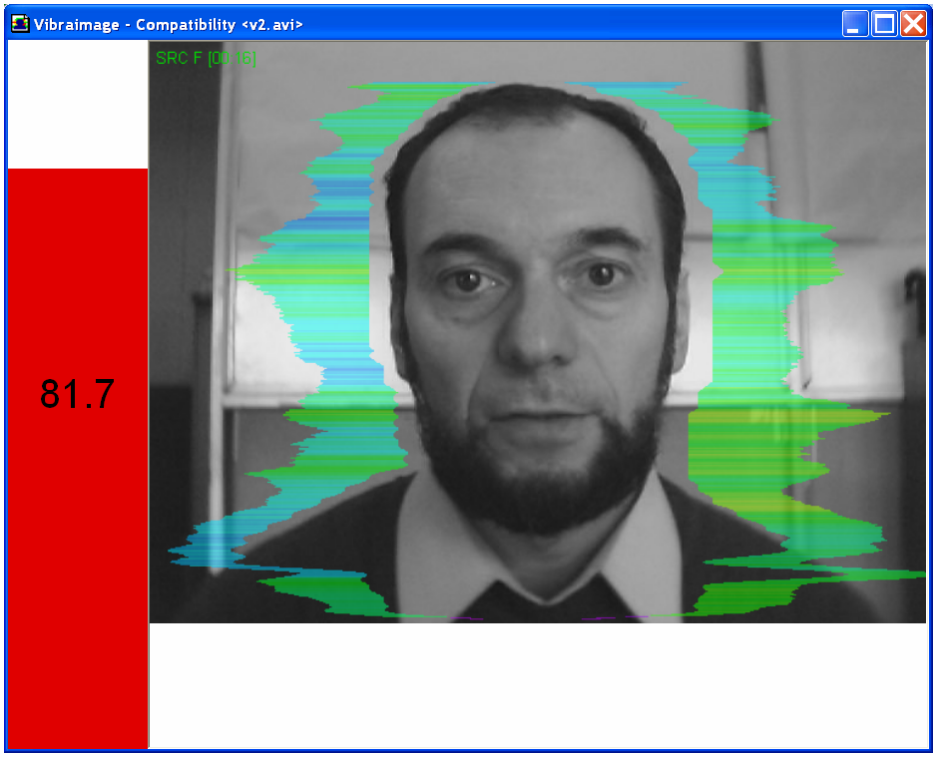


Fig. 5. VibraImageLite *main window*

Note, double click by the left button of a mouse in the image field of makes **RESET** of all saved up information and statistics about frames and start new cycle collection of information.

3.2. Main menu

For a call of the program menu it is necessary to click in a working window the mouse right button. The appeared main menu will consist of the following items (Fig. 6):

- **Preset** – choice of the basic modes of display of the information: VI – vibraimage, AV – aura on vibraimage, AR – aura on real image, LD – lie detect mode.
- **Video –** adjustment of a videocamera parameters or loading of an external videofile.
- **Language** – Choice of language of the interface and help system.
- **White background** – white background using
- **Skype mood** – At teamwork of Skype and Vibraimage programs you can observe current psychoemotion parameters of the interlocutor in Skype program window
- **VIDevice** – support virtual camera drivers;
- **About Vibraimage** - view the information about software version, license type and registered user name.
- **Help** – call the help system about full version VibraImage software.

In **BioTester** mode the appeared main menu will consist of the following additionally items (Fig. 7):

- **Start H 10s** – gathering of information is made for 10 seconds, and the window of frequency information viewing is showed automatically after 10 seconds
- **Frequency analysis results** - switching in a mode of frequency analysis graph display

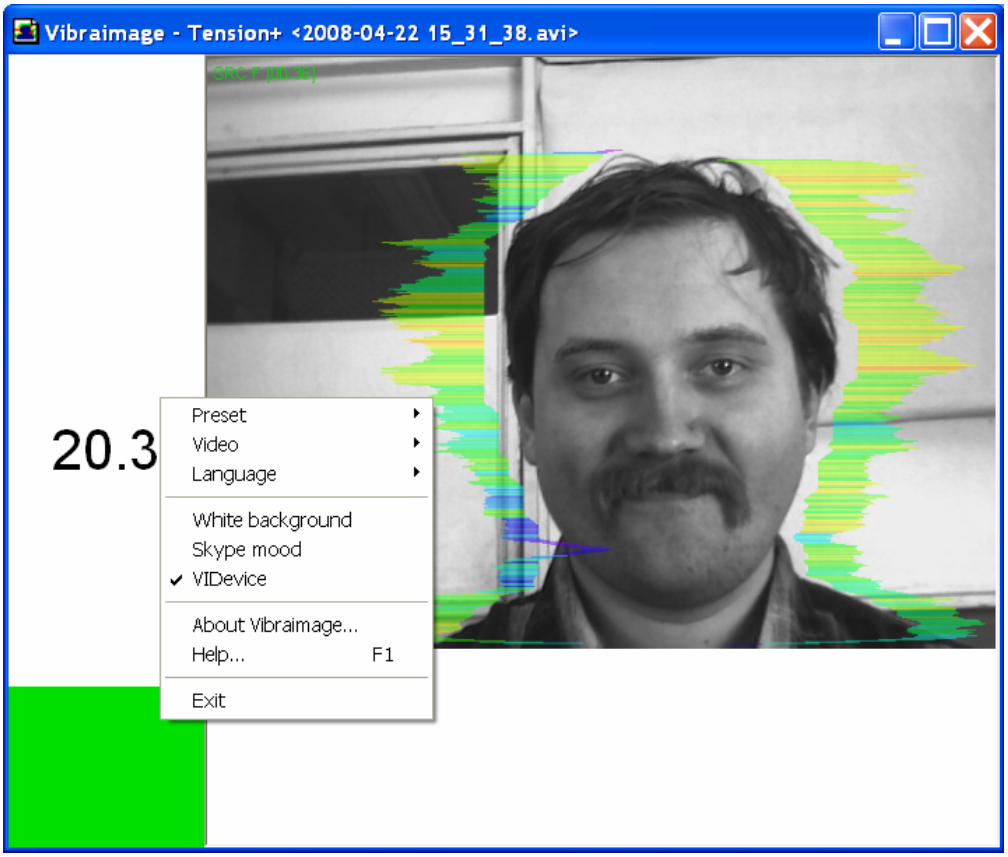


Fig. 6. Main menu

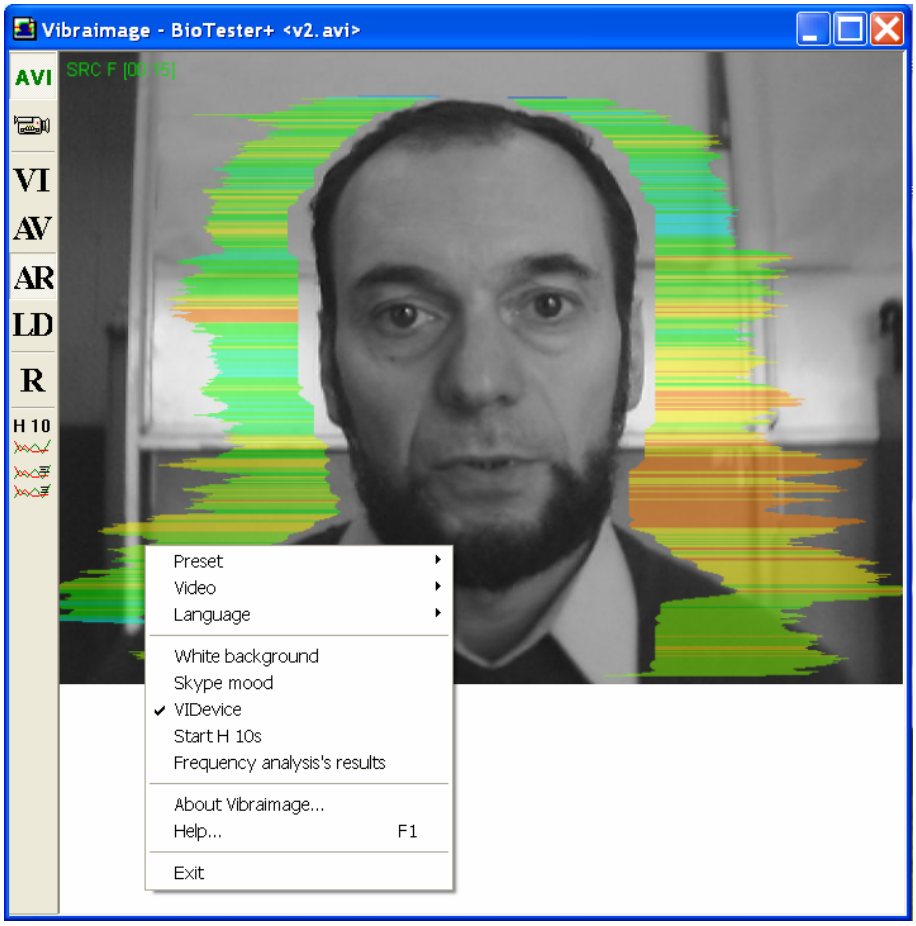


Fig. 7. Main menu in BioTester mode

Submenu **«Video»** contains options of video modes. Its can differ depending on connected devices. For example this menu contains the following items (Fig. 8). You can choose as video source one from many installing in PC video-devices or load external video file.

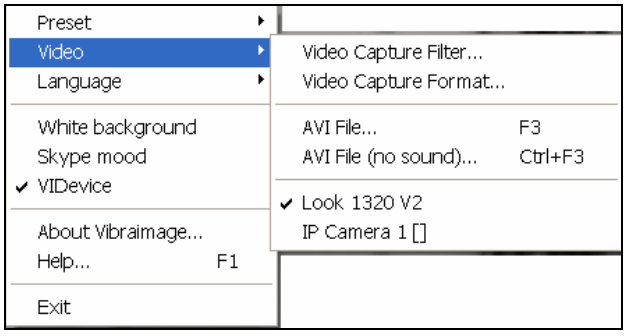


Fig.8. Submenu « Video»

«Video Capture Filter…» - by pressing the window of video device setting (contrast, exposition, brightness) opens. Each device has the especial window of settings.

«Video Capture Format…» - change video capture format.

VibraImage System allows to processing as the "alive" video signal acting from a videocamera, and the videodata, before written down and saved as a AVI-file. On default the system works with a signal from a videocamera. Subitems **« AVI File … F3 »** and **« AVI File (no sound) … Ctrl+F3 »** are intended for a choice for the analysis of an external videofile.

Mode **«File (no sound)…»** - use for load AVI files without audio support. This mode designed for work with VibraSound mode

3.3. Image area control

Vibraimages, images and external vibraimages (auras) are displayed in the image area.

The VibraImageLite basic window can be configured for surveillance in several operating modes.

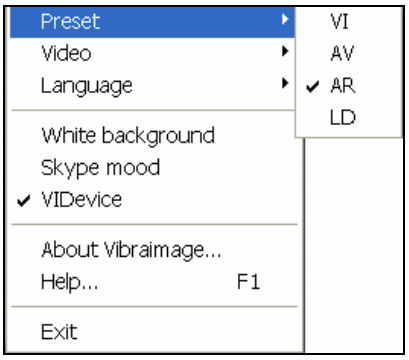


Fig. 9. Work mode select

Item **«Presets»** menu designed to choice one basic mode in image area.

- In **«VI»** mode [«VibraImage mode»] displays vibraimage of person. Color for every image pixel depends on its amplitude or frequency of vibrations (Fig. 12). In VibraImageLite version color for every image pixel depends on its vibrations frequency.
- In **«AV»** mode [«Aura Vibraimage mode»] external vibraimage (aura) allocated around the internal vibraimage or simple vibraimage. Aura line size depends on medium line vibration amplitude. Aura line color depends on maximum line vibration frequency inside vibraimage contour (Fig. 10).
- In **«AR»** mode [«Aura on the Real image»] the aura of the person is shown around his real image (Fig. 11).
- In **«LD»** mode [«Lie Detector mode»] image area shows real object image.

Note, at a displayed of the image in VI and AV modes it is possible to change color of a background of the image, having chosen main menu item « White background ».

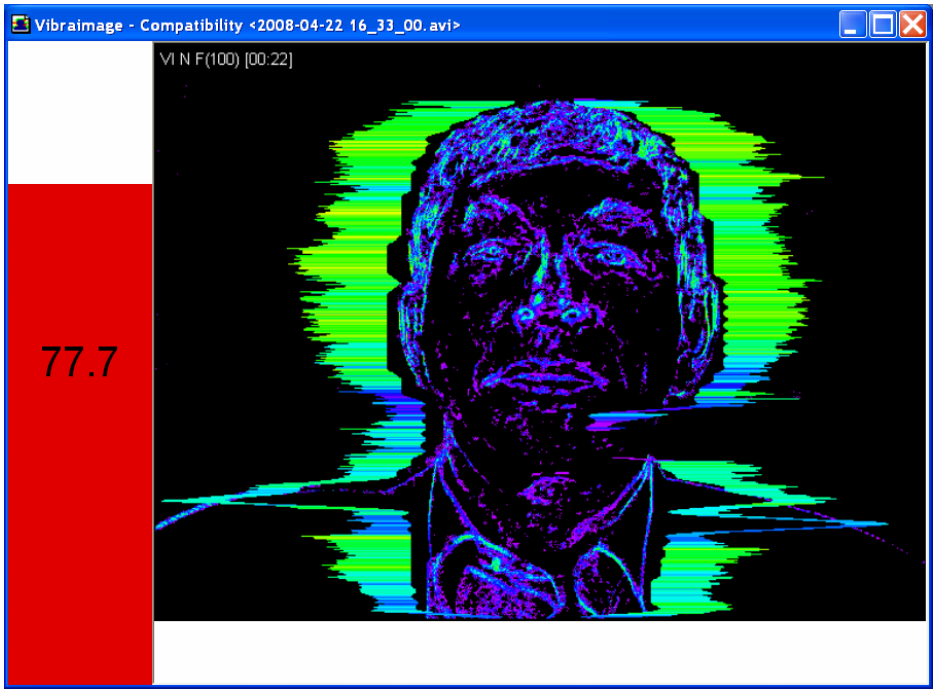


Fig. 10. AV mode on black background.

Fig. 11. AR mode.

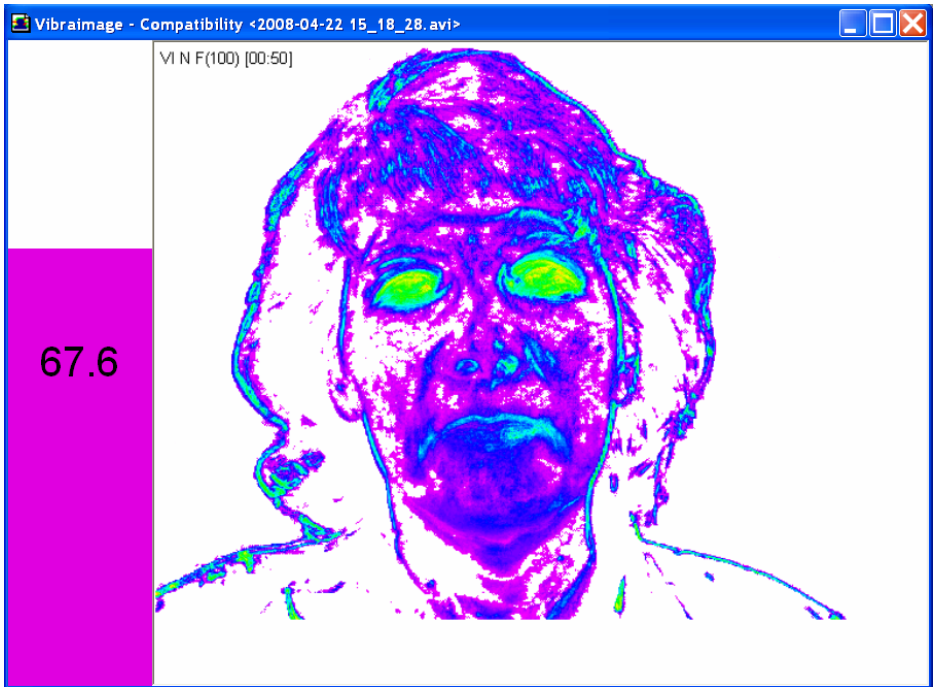


Fig. 12. VI mode on white background.

Note, in the left top corner of a image window the image processing mode (Fig. 13) and time from the beginning of viewing AVI file are showed.

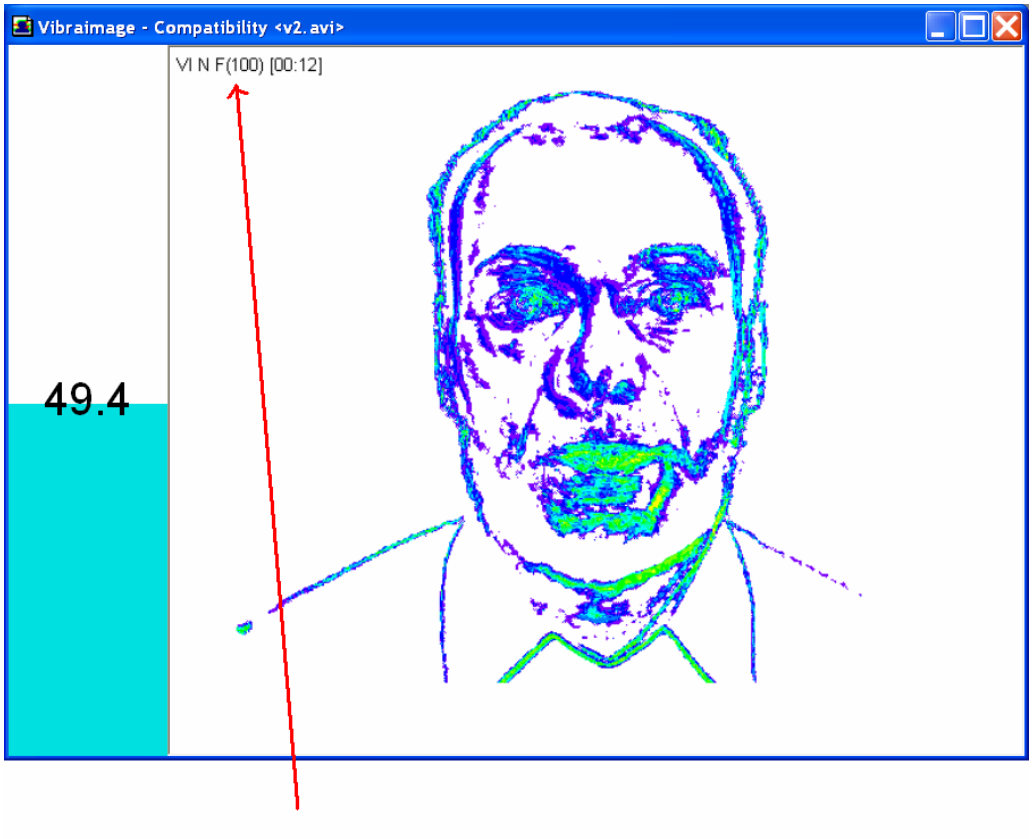


Fig. 13. Image example. Use VI mode with point frequency analysis(F)and average on N=100 frames.

3.4. VibraImage system operations

Head movements in space classically associated with vestibular system are studied and discussed in relation to the status of vestibular reflexes (i.e., the vestibuloocular, vestibulocollic, and cervicoocular reflexes). But it is possible to look on head movements according to the vibraimage system and technology. We supposed that head balance for person without consciously movements could be considered as isolated thermodynamic system and any emission of internal energy would change the balance of this isolated system and realized by movements or vibrations. Every emotional state characterized by specific energy conversation and work done by the system transfers to micro vibrations, if the person forced to stand or seet still. The head vibtration parameters (frequency in range 0,1-10 Hz and amplitude) are stable in time for stable emotional state of person. Parameters of vibrations changed only after emotional state alteration. VibraImage technolgy allows to contactless register of person vibration parameters and calculates emotions according to accomulated statistics of comparitive testing with EEG, skin galvanic reaction and psychological testing. VibraImage technics, parameters and research results are below.

3.4.1. VibraImage parameters

Values of amplitude and frequency of vibrations of a person head differ in each point of space and are displayed as pseudo color image. Integrated processing of parameters values of vibration in each point can give the general information on parameters of the person movement. Vibraimage the person heads displaying amplitude (see Fig. 14) and frequency (see Fig. 15) the distributions of vibrations modulated by a color scale (see Fig. 16), are resulted below:

Fig.14. Amplitude vibraimage

Fig. 15. Frequency vibraimage

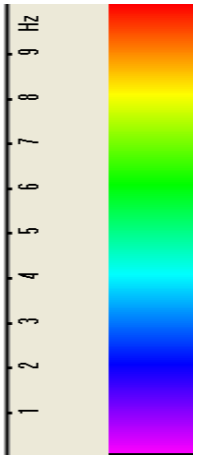


Fig. 16. Pseudo color scale of frequency distributions

Each point (pixel) amplitude vibraimage (Fig. 14) reflects the relative moving of an element of the image saved up for determined time as it is known, that at insignificant movings the interframes difference is proportional to movement of object. For transformation of this relative moving in absolute, it is necessary to have the exact information on distance up to object and a working corner of an objective of the chamber, then a color scale (see Fig. 16) can be scaled in millimeters or microns.

As against amplitude analyses, each point frequency vibraimage has physical dimension frequencies (Hz) as really displays frequency of signal change in each element of the image. Therefore the resulted color scale (see Fig. 16) scaling in Hz, i.e. violet color frequency vibraimage displays a range of vibrations (0-1) Hz, dark blue displays a range of vibrations (1-4) Hz, green the range of vibrations displays (4-8) Hz, red displays a range of vibrations (8-10) Hz.

On the basis of the given two primary images the technique assumes definition more than 40 integrated vibraimage parameters, reflecting various types of movement and vibration, and the parameters divided into 4 basic groups:

- A – amplitude parameters;
- F – frequency parameters;
- S – symmetry parameters;
- P – space and timing parameters of mathematic calculation.

3.4.2. Aura-VibraImage

External (around of a head) interline display of the maximal frequency and average amplitude vibraimage looks as aura and more informatively displays a condition of the person, than internal vibraimage. Color of aura is coded by the same color scale, as vibraimage (Fig. 17), and displays the maximal frequency in each line. The size of aura is defined by average amplitude for the given line. Any non-uniformity in color and the size of aura characterizes movements of object and its emotion condition. The normal condition of the person is characterized more uniform external vibraimage (aura), and for an intense condition of the person are characteristic the big space and color non-uniformity of aura.

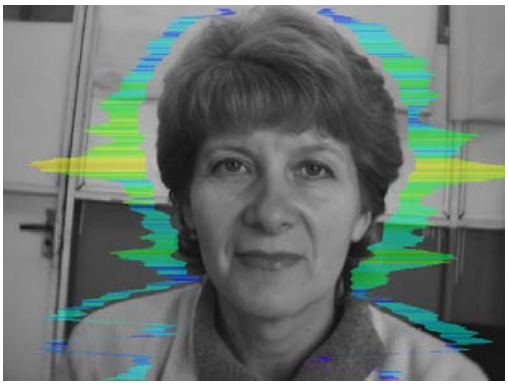


Fig. 17. External vibraimage (aura) of person in normal condition

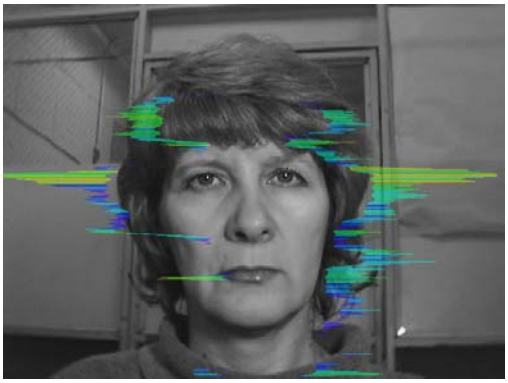
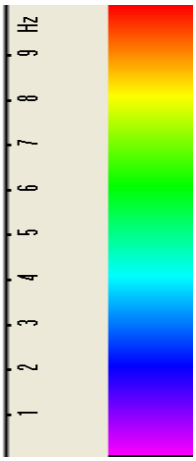


Fig. 18. External vibraimage (aura) of person in tension condition

Obvious distinctions between images on Fig. 17 and Fig. 18 illustrate advantages of the visual analysis of the person condition on external aura in comparison with the visual analysis initial vibraimage. The vibraimage method gives significant freedom of a choice of registration of a condition, and visual supervision of aura allows to estimate quickly and evidently practically all emotion parameters of the person. Brief interpretation of the form and color of aura is resulted below. This brief information does not limit, and sets to the user of system the basic directions of the analysis of person condition. Getting experience and taking into account the specificity of application, each user of system can diversify and deepen essentially results of the analysis of aura, open secret secrets of soul and a body of the person.



Red- activity and aggression color.

Yellow – trouble and tension color

Green- normal activity and top condition color

Blue- rest and calm color

Fig. 19. Brief aura color interpretation.

Brief aura form analysis

- Any aura asymmetry (form, color) characterized deviation from mental or physiological norms.
- Any breaks in aura uniformity characterized deviation from mental or physiological norms.
- Ideal aura has mono color, symmetrical and uniform. Any real aura differs from ideal and the question of interpretation is to characterized real aura deviations.

Note

This brief aura interpretation correspond default vibraimage system settings and based on main rules for right vibraimage scanning:

- uniform and stable object illumination;
- high quality and low nose camera application;
- frontal plane object before camera;
- maximum facial image size on monitor;
- mechanical stabilization of camera.

3.4.3. Samples of human aura visualization

Normal and top emotional state

Normal condition characterized by aura color and form uniformity around the head, relevant monochrome color in the middle of suggested color scale. Activity level is about 0,3–0,6. Stress level is about 0,2–0,5. Tension level is not more than 0,4. Every emotion level measured in the range from 0 till 1,0 and minimal value coordinates with minimal emotion intensity.

Frequency distribution histogram is near normal (Gauss) distribution and spectrum of high speed vibraimage signals is near exponential distribution.

Fig. 20. Aura photos samples for normal condition of persons.

Stress state

Stress state characterized by amount gaps in aura form and greatly aura colors non uniformity. Aura includes every scale colors and sharp color transfer, like red color could transfer to blue (Fig 21). Stress level more than 0,7. Aggression or activity level is low, not more than 0,5 and tension level is high and usually more than 0,4.

Frequency distribution histogram has several modes and high speed vibraimage signals spectrum presents superposition of exponential and uniform distributions.

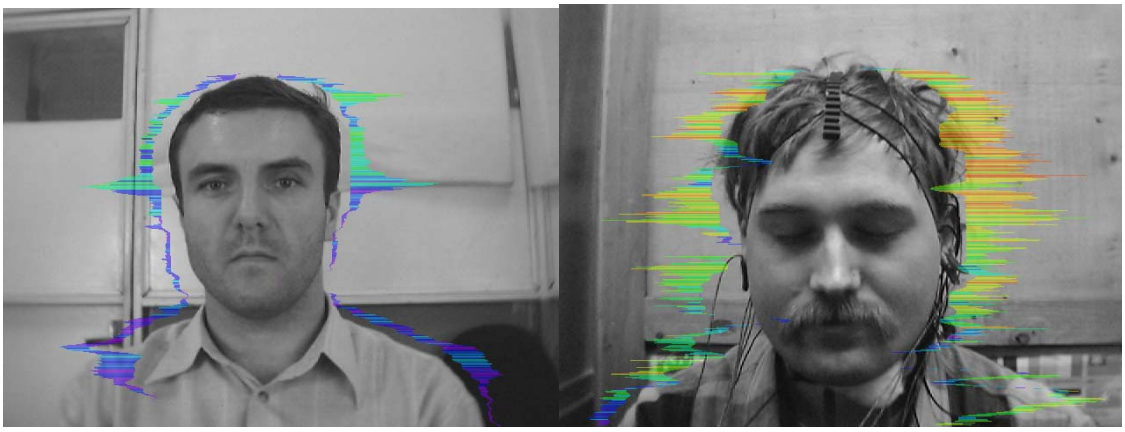


Fig. 21. Aura photos samples for stress condition of person.

Aggressive and/or tension state

Aggressive state is not every time coordinates with tension, and tension state is not always coordinates with aggression. But often these two emotions accompany each other. Aggressive state obligatory characterized by high frequency vibrations and red colors in aura. Aura size is more than normal and gaps could absent, but color and form non uniformity must present (Fig 22). Stress level could be low, less than 0,3. Anger level more than 0,7 and tension level more than 0,4.

Frequency histogram distribution has maximum in right part of the range and distribution has amount dispersion. High speed signals spectrum envelope looks like uniform distribution.

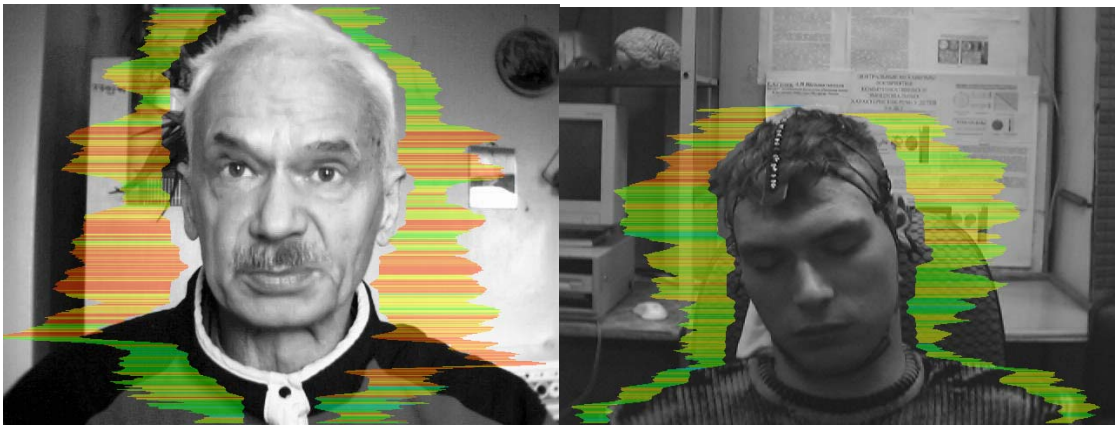
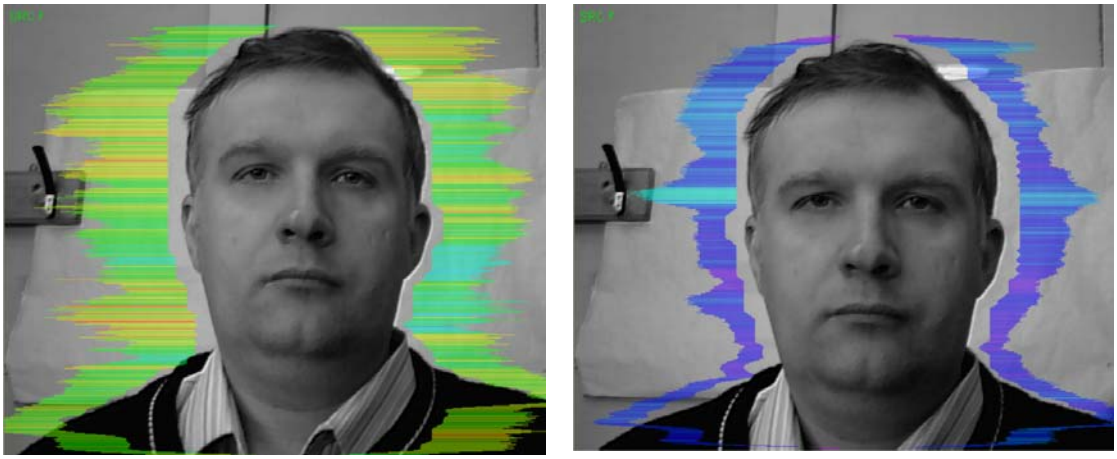


Fig. 22. Aura photos samples for aggression condition of persons.

Meditation

VibraImage system application allows to register distinction not only between the aggressive (abnormally excited) and normal condition of the client, but also and to register a degree of condition change of the person when the person calms down (see Fig. 23) or meditates.



A) B)

Fig. 23. Examples of self-correction person emotional conditions. A - in 10 seconds after the beginning of supervision. B - in 100 seconds (the person have asked to calm down and count up to 100).

People compatibility

VibraImage system application allows to register people compatibility on the basis of their vibraimage analysis (see Fig. 24). For reception of a correct estimation of compatibility it is necessary to carry out the rules necessary for reception qualitative vibraimage:

- Two persons sit down beside as it is possible closely more to each other.
- Web camera is stand opposite and adjusted so that on the computer screen the image of two persons completely entered in the screen of a computer was visible.
- The distance from each person up to lateral screen side should be identical and make approximately 10 % from width of the monitor screen.
- Light exposure of pair should be sufficient and uniform.
- Persons should be inverted to the camera and not concern each other.
- Any other physical contact of pair, (embraces, pressings and other) only is welcomed and are raised measurement accuracy.
- The background should be uniform and it is desirable contrast concerning pair.

Fig. 24. Correct position of people pair

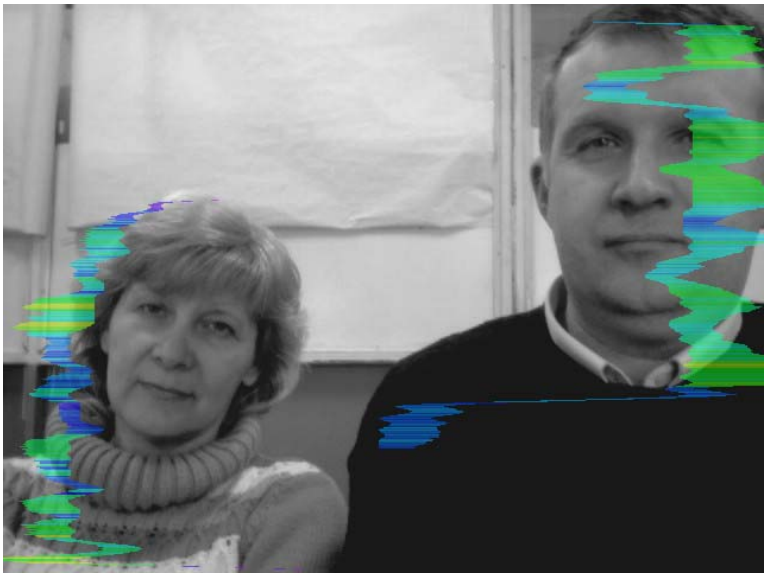


Fig. 25. Wrong position of people at check of their compatibility. People are on different distance from the camera and far apart.

Compatibility Estimation

Ideal compatibility of pair is characterized completely by symmetric aura. Any asymmetry of aura, characterizes the certain problems in compatibility, the more asymmetry, the it is more than problems in compatibility.

To the maximal compatibility there correspond the following aura parameters:

1. The symmetric form of aura from both sides of the researched pair
2. Symmetric painting aura from both sides of the researched pair